

EXPERT SYSTEM VERIFICATION AND VALIDATION STUDY

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ES V&V Guidelines/Workshop Conference Summary

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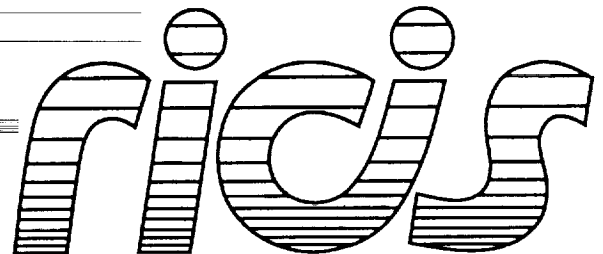
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***Research Institute for Computing and Information Systems
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INTERIM REPORT

The RICIS Concept

The University of Houston-Clear Lake established the Research Institute for Computing and Information Systems (RICIS) in 1986 to encourage the NASA Johnson Space Center (JSC) and local industry to actively support research in the computing and information sciences. As part of this endeavor, UHCL proposed a partnership with JSC to jointly define and manage an integrated program of research in advanced data processing technology needed for JSC's main missions, including administrative, engineering and science responsibilities. JSC agreed and entered into a continuing cooperative agreement with UHCL beginning in May 1986, to jointly plan and execute such research through RICIS. Additionally, under Cooperative Agreement NCC 9-16, computing and educational facilities are shared by the two institutions to conduct the research.

The UHCL/RICIS mission is to conduct, coordinate, and disseminate research and professional level education in computing and information systems to serve the needs of the government, industry, community and academia. RICIS combines resources of UHCL and its gateway affiliates to research and develop materials, prototypes and publications on topics of mutual interest to its sponsors and researchers. Within UHCL, the mission is being implemented through interdisciplinary involvement of faculty and students from each of the four schools: Business and Public Administration, Education, Human Sciences and Humanities, and Natural and Applied Sciences. RICIS also collaborates with industry in a companion program. This program is focused on serving the research and advanced development needs of industry.

Moreover, UHCL established relationships with other universities and research organizations, having common research interests, to provide additional sources of expertise to conduct needed research. For example, UHCL has entered into a special partnership with Texas A&M University to help oversee RICIS research and education programs, while other research organizations are involved via the "gateway" concept.

A major role of RICIS then is to find the best match of sponsors, researchers and research objectives to advance knowledge in the computing and information sciences. RICIS, working jointly with its sponsors, advises on research needs, recommends principals for conducting the research, provides technical and administrative support to coordinate the research and integrates technical results into the goals of UHCL, NASA/JSC and industry.

Preface

This research was conducted under auspices of the Research Institute for Computing and Information Systems by Scott French and David Hamilton of the International Business Machines Corporation. Dr. T. F. Leibfried served as RICIS research representative.

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The views and conclusions contained in this report are those of the authors and should not be interpreted as representative of the official policies, either express or implied, of RICIS, NASA or the United States Government.

**ES V&V Guidelines/Workshop Task
RICIS Contract #69 Deliverable #3 - Conference Summary**

March 24, 1992

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Preface

This document summarizes, as part of deliverable #3, the results of the first winter workshop on *Gauging Where We Are In The Verification And Validation Of KBSs* co-sponsored by NASA/JSC and the Electric Power Research Institute (EPRI). The workshop convened at the JSC Gilruth Center over February 3 and 4, 1992.

Introduction

For the past few years, researchers interested in advancing the state of the practice in verification and validation (V&V) of Knowledge-Based systems (KBSs) have met periodically to address significant issues related to this goal. This same group met on February 3 and 4, 1992 at JSC's Gilruth Center to begin addressing the following issues:

- Developing guidelines for selection and/or generation of benchmark knowledge-bases
- Developing criteria for comparing specific V&V tools
- Developing criteria for more general methods and approaches
- Defining the scope for tools/methods by examining V&V analysis already performed on existing systems
- Establish what kinds of results are desired based on these comparisons

A separate sub-group was defined for each of the issues raised above. Each of these groups met separately to discuss their specific issue. Results from these separate discussions were summarized and then presented to the rest of the workshop attendees.

Summary of Results

The intent of the workshop was to start moving KBS V&V research in the direction of providing tangible "products" that a KBS developer can use. These results can be summarized as follows:

- Provide developers with a classification of kinds of errors versus the kind of KBS being developed. In the near term, research will focus on identifying the kinds of experiences encountered during KBS development of "real" KBSs. These will be stored in a repository and will serve as the foundation for the rest of the activities described here.
- Provide developers with specific criteria for comparing one test tool against another. One specific approach to be pursued is "benchmarking." With this approach, a KBS developer can use either "canned" KBSs with seeded errors or existing KBSs with known errors to evaluate a given tools ability to satisfactorily identify errors.

- Provide developers with help in identifying the appropriate artifacts to be produced during KBS development.

Based on these results, specific actions were given/taken to make progress toward these objectives. The progress will be reviewed at the AAAI workshop to be held in July of 1992.

Implications

This section summarizes, based on the workshop results, some key implications regarding the ES V&V Guidelines workshop developed under this contract.

1. Show how existing trace and diagnostic capabilities of ES shells can be used to help with testing. Nick Sizemore made this suggestion when discussing the lack of available testing tools.
2. Include some information on error categories. There is existing information on error categories for conventional software and we could come up with at least some information (e.g., a partial list) for expert systems. If we expand on this idea, we could go as far as generating some checklists that could be used for inspections and testing.
3. Include some information on artifacts (i.e., work products) that could be useful in the V&V process (e.g., test plans, test results, problem descriptions, user's guides, meta-knowledge, etc.). This would have to be done in a way that does not overwhelm the student (i.e., documentation generally has a negative impact so describing lots of different documents that they should develop might negatively influence their decision to apply V&V approaches).
4. Include some information on different kinds of expert systems along with information relating types of errors to kinds of expert systems